

Discovering Derivative Properties

For each of the following problems, a function $f(x)$ is given. You are to try to discover the function $f'(x)$ by finding a match for the calculator generated function $nDeriv(Y1,X,X)$.

1. Put the given function $f(x)$ into Y1 of your graphing calculator. (You may want to turn it off by deactivating it.)
2. Let $Y2 = nDeriv(Y1,X,X)$.
3. Guess the function that you see in Y2 and check your guess by putting it into Y3.
4. If it matches, record your answer, if it doesn't, try again!
5. Don't forget, we are looking for patterns and generalizations that we can write as a property.

I. 1. $f(x) = x$ $f'(x) =$ _____

2. $f(x) = x^2$ $f'(x) =$ _____

3. $f(x) = x^3$ $f'(x) =$ _____

4. $f(x) = x^4$ $f'(x) =$ _____

Property (The Power Rule):

If $f(x) = x^n$, then $f'(x) =$ _____

II. 5. $f(x) = 4x^2$ $f'(x) =$ _____

6. $f(x) = -2x^3$ $f'(x) =$ _____

7. $f(x) = 7x$ $f'(x) =$ _____

Property:

If k is a number and $f(x) = k g(x)$,
then $f'(x) =$ _____

III. 8. $f(x) = 6$ $f'(x) =$ _____

9. $f(x) = -3$ $f'(x) =$ _____

Property:

If k is a number and $f(x) = k$, then $f'(x) =$ _____

IV. 10. $f(x) = -x^2 + 5x - 6$ $f'(x) =$ _____

11. $f(x) = \frac{1}{3}x^3 - \frac{1}{2}x^2 - 6$,

$f'(x) =$ _____

Property:

If $f(x) = g(x) + k(x)$, then $f'(x) =$ _____

V. 12. $f(x) = \frac{1}{x} =$ _____ $f'(x) =$ _____

13. $f(x) = \sqrt{x} =$ _____ $f'(x) =$ _____

14. $f(x) = \sqrt[3]{x} =$ _____ $f'(x) =$ _____

Question: Does the Power Rule hold for other numbers besides whole numbers?

Negative whole numbers? _____

Rational numbers? _____